

Remarks

Double Patenting Rejections

Claims 34-41 and 43-46 have been rejected under the judicially created doctrine of double patenting over claims 1-43 of US Patent No. 5,302,891. In response to these rejections a Terminal Disclaimer is being filed concurrently with this Amendment.

Rejections Under 35 USC §112

I. Claims 34-41 and 43-46 have been rejected under 35 USC §112, first paragraph, as containing subject matter which was not described in the specification in such a way to reasonably convey to one skilled in the art that the inventor had possession of the claimed invention. These rejections are traversed for the same reasons advanced in the Amendment dated January 3, 2002.

In support of the 35 USC §112, first paragraph rejections the Office Action states: "The only portion of the specification that relates to the embodiment of figure 8 is the last 6 lines on page 11 of the specification".

If Figure 8 and the last 6 lines on page 11 made up the entire specification, then perhaps the 35 USC §112, first paragraph rejections would be valid. However, the entire specification is available to one skilled in the art to satisfy the enablement requirements of 35 USC §112. In this regard the specification states at column 7, lines 24-26: "Figure 8 shows a modification of the invention, in which flexible tape is used to directly connect the die to an external connector connected to external test circuitry". This implies that the embodiment of Figure 8 is a variation of the embodiment of Figures 1 and 2, and should be interpreted in combination with Figures 1 and 2.

In addition, the claim recitations outlined on page 3, lines 2-8 of the Office Action as having no antecedent basis are present in the specification as follows:

"first plate" is die cavity plate 13 at page 8, line 3;

"second plate" is cover 15 at page 8, line 3;

"plastic film" is plastic film 43 at page 9, line 9;

"test circuitry" is at page 7, line 26;

"conductive trace" is conductive trace 45 at page 9, line 9;

"bumps" are bumps 47, 48 at page 9, line 12;

"electrical connector" is external connector at page 11, line 33;

"direct electrical path" is directly connect at page 7, line 25;

"polyamide" is at page 9, line 10;

"plastic film" is at page 9, line 9;

"die receiving cavity" is die receiving cavity 17 at page 8, line 5;

"elastomeric biasing member" is biasing member 33 at page 9, lines 26-27;

"compressible elastomeric pad" is biasing member 33 at page 9, lines 26-27;

"a connector providing an electrical path independent of the first plate and the second plate" is not present but has been removed from the claims;

"cavity" is die receiving cavity 17 at page 8, line 5;

"spacer member" is space plate 29 at page 8, line 9.

It is further submitted that Applicants' arguments on the nonobviousness of the present claims over references that disclose wafer level test apparatus have no bearing on the issue of enablement under 35 USC §112.

II. Claims 34-41 and 43-46 have been rejected under 35 USC §112, first paragraph, as containing subject matter

which was not described in the specification in such a way to enable one skilled in the art at the time of the invention to make or use the invention. These rejections are traversed for the same reasons as argued above. In particular one skilled in the art could build the embodiment of Figure 8 using all of the specification as a source.

III. Claims 34-41 and 43-46 have been rejected under 35 USC §112, second paragraph, as being indefinite. These rejections are traversed for the same reasons as argued above. However, the claims have been amended to achieve literal support from the specification for each term in the claims. In this regard the term "first plate" has been changed to -plate--. Antecedent basis is provided on page 8, line 3 of the specification. The term "second plate" has been changed to -cover--. Antecedent basis is provided on page 8, line 3 of the specification. The term "direct electrical path" has been changed to -directly connect--. Antecedent basis is provided on page 7, line 25 of the specification. The term "polyimide" has been changed to -polyamide--. Antecedent basis is provided on page 9, line 10 of the specification.

Rejections Under 35 USC §102(b)

Claims 34-41 and 43-46 have been rejected under 35 USC §102(b) as being anticipated by Kattner et al., Enochs, Jamison et al., Greub et al., Littlebury et al., Malhi et al., Elder et al. '850 or Item 32636 of the Research Disclosure No. 326.

The rejections under 35 USC §102(b) are traversed for the same reasons advanced in the Amendment dated January 3, 2002. In this regard a proper 35 USC §102(b) rejection requires that a single reference identically describe each element of the rejected claims. None of the references

taken individually describe every element of the present test fixture.

Kattner et al.

Kattner et al. does not disclose a "test fixture" with a "tape" comprising "a plastic film" having "a bump on the film for physically and electrically contacting a contact on the die". Rather, in Kattner et al. probes 102 of a microprobe are formed by the ends of leads 104 which are mounted to a deformable member 101. As stated at column 4, lines 41-43 of Kattner et al.: "The ends of the leads are provided with raised portions which form the probes 102 as shown particularly in Figure 7". The probes 102 and leads 104 appear to be similar to conventional probe needles that can bend and deform with continued use. In the present case the bumps are "on the film" and therefore supported from deformation while being able to move to accommodate dimensional variations. Kattner et al. thus teaches a contact structure that is fundamentally different from the present contact structure.

In addition, the presently claimed "tape" element is a flexible element (see Figure 8) which provides an advantage for making electrical connections. In contrast, in Kattner et al. a plastic film is mounted to a backing plate (column 4, line 10-12). Plates are generally rigid, rather than being flexible like films, making electrical connections more difficult. In view of these differences the present claims are submitted to be novel and unobvious over Kattner et al.

Enochs

Enochs is directed to a "package for connecting an integrated circuit chip to an etched circuit board (col. 1, lines 39-40), rather than to a "test fixture for testing a semiconductor die" as presently claimed. In addition, Enoch does not disclose a "tape" with a "connector" that

extends beyond the confines of the fixture as presently claimed. In view of these differences the present claims are submitted to be novel and unobvious over Enochs.

Jamison et al.

In Jamison et al. there is no electrical connection through the apparatus (10-Figure 1) provided by a "tape" comprising a "plastic film", a "bump on the film", a "trace on the film" and an "electrical connector". Although the Jamison et al. apparatus (10-Figure 1) includes a film (50-Figure 1), the film is contained within the apparatus (see Figure 3). In addition, an interface board 45 makes the electrical connections between the film and the test circuitry (see column 3, line 5 of Jamison). The electrical connections must be made between the pads (55-Figure 1) on the film (50-Figure 1) and the pads (47-Figure 1) on the board (45-Figure 1). These electrical connections can add resistance to the electrical path through the apparatus, and require additional elements and process steps to make. With the present test fixture the "traces" provides a low resistance electrical path without the requirement of intermediate electrical connections. In view of these differences the present claims are submitted to be novel and unobvious over Jamison et al.

Greub et al.

Greub et al. is directed to a "probe for integrated circuits in wafer form" rather than to a test fixture for a semiconductor die. Although as mentioned in the Office Action a wafer could contain only one die, this is not the case in the semiconductor industry. Rather, wafers contain many dice such that manufacturing costs can be reduced. In addition, Greub et al. does not disclose a "tape" with a "connector" that extends beyond the confines of the fixture as presently claimed. In view of these differences the

present claims are submitted to be novel and unobvious over Greub et al.

Littlebury et al.

Littlebury et al. is directed to an apparatus for burning in semiconductor wafers. On the other hand, the present claims are directed to a "test fixture for testing a semiconductor die". The Office Action states: "The test of wafers, die and multichip hybrids are considered equivalent". This assertion is respectfully disputed. Wafers, hybrids and dice have different sizes, shapes, weights, and electrical characteristics. Different equipment and methods are typically used to test wafers, hybrids and dice. Although the '850 Elder et al. test socket can be used for testing both dice and wafers, there is no indication that the Littlebury et al. apparatus can be used to test discrete dice.

In addition, the Littlebury et al. apparatus includes a membrane 12 having bumps 19 for making the temporary electrical connections with the contact pads 21 on the wafer 11. The membrane is stated to be a "flexible printed circuit board material" (column 3, lines 21-25). Such a printed circuit board material is not a "tape" as claimed in the independent claims. The presently claimed "tape" is more flexible than circuit board material, such that the "bumps" more easily conform to the topography of the die. In addition, the presently claimed "tape" can be biased against the die with less force, such that damage to the die is less likely to occur. Still further, the presently claimed "tape" can comprise TAB tape which is available in standardized bump patterns developed for semiconductor packaging. In view of these differences the present claims are submitted to be novel and unobvious over Littlebury et al '190.

Malhi et al.

In Malhi et al. '190 the connection circuit 32 and the compliant layer 31 do not extend from the socket 10, but rather are contained within the socket 10. In addition, the connection circuit 32 in Malhi et al. is bonded to wire bonds 25, which are bonded to external pins 26, which connect to test circuitry. The additional bonded connections do not "directly connect" the test circuitry as with the presently claimed "film", "trace on the film" and "connector". In view of these differences the present claims are submitted to be novel and unobvious over Malhi et al '190.

Elder et al. '850

Elder et al. '850 is directed to a test socket having contact bumps 24 on a polyimide film 25. However, the film 25 does not extend past the confines of the fixture and does not include an electrical connector as presently claimed. Rather pins 13 are configured for electrical connection to pin sockets 11 in a base 10 (column 3, lines 15-16). As shown in Figure 6, wire bonding pads 18 on the film 25 electrically connect the contact bumps 24 to the pins 13. The present test fixture does not have pins or wire bonds, such that the electrical resistance added by these components is eliminated. In view of these differences the present claims are submitted to be novel and unobvious over Elder et al. '850.

Research Disclosure

The rejections based on the Research Disclosure reference are traversed based on the publication date of this reference being after the June 4, 1991 priority date of the present application. The Research Disclosure reference identifies the date of the reference as June 1991. However, June has 30 days, and 25 of those days are later than June 4. Without more evidence it cannot be

assumed that the effective date of this reference precedes the present priority date.

In addition, the independent claims are submitted to patentably distinguish from the Research Disclosure reference. In particular, this reference teaches "decals wiring 2" which makes the temporary electrical connections to the wafer 10. The decal wiring is not described as a "tape" comprising a "plastic film" and a "conductive tape" as presently claimed, such that the Research Disclosure reference is not enabling on this feature. Accordingly, this reference does not place the presently claimed subject matter in the possession of the public. The present claims are thus submitted to be novel and unobvious over the Research Disclosure reference.

Rejections Under 35 USC §103(a)

Claims 34-41 and 43-46 have been rejected under 35 USC §103(a) over any of Kattner et al., Enochs, Jamison et al., Greub et al., Littlebury et al., Malhi et al., Elder et al. '850 or Item 32636 of the Research Disclosure No. 326. The 35 USC §103(a) rejections are traversed for essentially the same reasons as stated above for the 35 USC §102(b) rejections. Specifically, none of the references taken individually disclose the features of the present claims as required by MPEP 2142, 2143.

Rejections Under 35 USC §102(e)

Claims 34-41 and 43-46 have been rejected under 35 USC §102(e) as being anticipated by Item 32636 of the Research Disclosure No. 326. These rejections are traversed because it has not been established by the Examiner that the June 1991 publication of this reference precedes the June 4, 1991 priority date of the present application. As argued in the Amendment dated January 3, 2002, the Examiner bears the initial burden of presenting a prima facie case, and only if the burden is met, does the burden of coming

forward shift to the applicant (In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d, 1443, 1444 (Fed. Cir. 1992)).

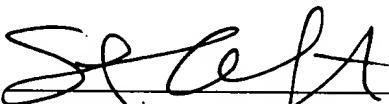
These rejections are further traversed as argued above, because it has not been established by the Examiner that the decal wiring 2 of this reference comprises a plastic film and a conductive trace as presently claimed.

Conclusion

In view of the amendments and arguments, favorable consideration and allowance of claims 34-41 and 43-46 is requested. Should any issues remain, the Examiner is asked to contact the undersigned by telephone.

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August 1, 2002
Date of Signature


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Marked Version Of Amended Claims Showing Changes

34. (twice amended) A test fixture for testing a semiconductor die comprising:

a [first] plate for receiving the die;

a [second plate] cover attached to the [first] plate for retaining the die therebetween; and

a tape placed between the [first] plate and the [second plate] cover for electrically connecting the die to a test circuitry, the tape comprising a plastic film, a bump on the film for physically and electrically contacting a contact on the die, a conductive trace on the film in electrical communication with the bump, and an electrical connector in electrical communication with the trace and connectable to the test circuitry;

with the connector, and at least a portion of the trace extending beyond a confine of the fixture, and with the bump, the trace, and the connector configured to [provide a direct electrical path from] directly connect the test circuitry to the contact on the die.

35. (twice amended) The fixture of claim 34 wherein the film comprises [polyimide] polyamide.

36. (amended) The fixture of claim 34 wherein the [first] plate [comprises] includes a die receiving cavity [sized] configured to receive the die.

37. (amended) The fixture of claim 34 further comprising an elastomeric biasing member [placed] between the [first] plate and the [second plate] cover for biasing the bump against the contact.

38. (amended) The fixture of claim 34 further comprising a clamp for securing the [first] plate to the [second plate] cover.

39. (twice amended) A test fixture for testing a semiconductor die comprising:

a [first] plate for receiving the die;

a [second plate] cover attached to the [first] plate for retaining the die on the [first] plate; and

a tape for electrically connecting the die to a test circuitry, the tape comprising a plastic film, a bump on the film for physically and electrically contacting a contact on the die, a conductive trace on the film in electrical communication with the bump, and an electrical connector in electrical communication with the trace and connectable to the test circuitry;

with a first portion of the film placed between the [first] plate and the [second plate] cover and biased against the die;

with a second portion of the film and the connector extending beyond a confine of the fixture, and with the bump, the trace and the connector [providing a direct electrical path from] configured to directly connect the test circuitry to the contact on the die.

40. (amended) The test fixture of claim 39 further comprising a compressible elastomeric pad [placed] between the [first] plate and the [second plate] cover configured to bias the first portion of the film against the die.

41. (amended) The test fixture of claim 39 wherein the film comprise [polyimide] polyamide and the bump comprises solder.

43. (twice amended) A test fixture for testing a semiconductor die comprising:

a [first] plate for receiving the die;
a [second plate] cover attached to the [first] plate for retaining the die on the [first] plate; and

a tape for electrically connecting the die to a test circuitry, the tape comprising a plastic film, a bump on the film for physically and electrically contacting a contact on the die, a conductive trace on the film in electrical communication with the bump, and an electrical connector in electrical communication with the trace and connectable to the test circuitry;

a compressible elastomeric pad [placed] between the [first] plate and the [second plate] cover for biasing the bump against the contact;

with a first portion of the film placed between the [first] plate and the [second plate] cover and biased against the die by the pad;

with a second portion of the film and the connector extending beyond a confine of the fixture, and with the bump, the trace, and the connector [providing an electrical path independent of the first plate and the second plate, from] configured to directly connect the test circuitry to the contact on the die.

44. (amended) The test fixture of claim 43 wherein the bump comprises solder.
[a material selected from the group consisting of metal and a conductive polymer.]

45. (amended) The test fixture of claim 43 wherein the [first] plate includes a cavity for retaining the die.

46. (amended) The test fixture of claim 43 wherein the [first] plate includes a cavity and a spacer member within the cavity for retaining the die.